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ABSTRACT

Nutrition is well-recognized as a necessary component of educational programs for physicians. This is to be valued in that of all factors affecting health in the United States, none is more important than nutrition. This can be argued from various perspectives, including health promotion, disease prevention, and therapeutic management. In all cases, serious consideration of nutrition related issues in the practice is seen to be one means to achieve cost-effective medical care. These modules were developed to provide more practical knowledge for health care providers, and in particular primary care physicians. The goal of this module is to familiarize the student with the appropriate nutritional care of the adolescent. Changes in nutritional requirements, typical nutritional problems, and eating patterns of adolescents are discussed. Special attention is given to the adolescent male athlete and to the weight-conscious menstruating female. Included are the learning goals and objectives, self-checks of achievement with regard to goals, and references for the physician and for the physician to give to the patient. The appendices include a chart of nutritional analysis of fast foods, a list of food sources of iron, a method for determining minimum wrestling weight, and a nomogram for percentage of body fat. (CW)

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6 Normal Diet: Adolescence

Elizabeth Tuckermanty
Charlette R. Gallagher-Allred

Nutrition in Primary Care

Department of Family Medicine
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Columbus, Ohio 43210

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6 Normal Diet: Adolescence

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6 Normal Diet: Adolescence

Nutrition in Primary Care

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Introduction

Adolescence is an extended period of time characterized by nutritional stresses such as rapid growth and development and psychological and social pressures which may lead to irregular nutritional patterns. The goal in this module is to familiarize you with the appropriate nutritional care of the adolescent. Changes in nutritional requirements, typical nutritional problems, and eating patterns of adolescents are discussed. Special attention is given to the adolescent male athlete and to the weight-conscious, menstruating female.

Goals

As a result of this unit of study, you should be able to:

1. *Describe the nutritional implications of the adolescent growth spurt;*
2. *Select the appropriate kilocalorie level and amount of protein needed for an adolescent male football player during his training period;*
3. *Evaluate an overweight adolescent female's diet and activity level for a weight-reduction program;*
4. *Identify nutrients that may need to be supplemented for the menstruating female;*
5. *Explain the relationships between nutrition and acne in a way that an adolescent patient would understand; and*
6. *State your philosophy on the value of fast foods and so-called junk foods in the diet of an adolescent.*

Adolescent Growth and Development

Adolescence is a phase of rapid growth and development marked by dramatic psychological, social, and physiological changes.

Adolescence is a phase of growth and development marked by dramatic changes. Psychologically and socially, the adolescent experiences new independence, new opportunities to make decisions, and an ever-increasing orientation to peer pressure. Many factors inevitably affect the adolescent's self-image. As a new self-image evolves, the adolescent is extremely vulnerable to criticism, whether external or self-inflicted. Criticism regarding weight status can be especially devastating.

Obese adolescents are discriminated against in many ways. Not only are they harassed by their parents but they are often rejected by their peer group, laughed at in movies and on television, excluded from the mainstream of teen-age life, and set apart from the "average" by the fashion industry. Physiological changes occur in every organ of the body during adolescence. At no time other than infancy is the growth rate as rapid as it is during adolescence. Increased metabolic rate and rapid growth both increase the nutrient requirements of the adolescent. Changes in physical appearance inevitably affect the adolescent's self-image. Preoccupation with physical appearance can and often does affect nutrition-related behavior.

Rapid physical changes inevitably affect adolescents' self-esteem as they are continually adjusting to an evolving sense of self.

The growth spurt occurs approximately 2 to 2½ years earlier in the female (between 10 and 11 years) than in the male (between ages 12 and 14). In the female, the adolescent growth spurt is characterized by rapid linear growth, increases in adipose tissue, and small increases in muscle tissue. The growth-spurt onset is signaled by signs of breast development and pubic hair. Menarche occurs toward the end of the growth spurt. Epiphyses of long bones close, and the female ends her linear growth at the median age of 17 years.

In the male, secondary sexual characteristics signal the beginning of the growth spurt. Adipose tissue is initially gained and then reduced in the limbs, and muscle mass increases dramatically. By the end of adolescence, males have one-third more muscle cells than females. Males tend to continue linear growth late into their teens and early twenties.

The differences in body composition between adolescent males and females are significant. Nutrient requirements during adolescence also become very different from those of the earlier years. This can partially be explained because of size, but muscle mass and adipose mass also contribute to the differences in requirements. Compare the changes in the RDA between the 7- to 10-year-old child and the 11- to 14-year-old male and female in Tables 6–1 and 6–2.

Nutrient Requirements for Adolescence

Energy

Energy requirements during adolescence increase dramatically during the growth spurt. A particular individual's needs should be based upon physiological age, maturation, rate of growth, activity level, and size.

The only way to clinically separate the adolescent who is temporarily "pudgy" from one who has a potential weight problem is to consider longitudinal data. Height, weight, and triceps skinfold are anthropometric measures that should be monitored beginning at birth and continuing through adolescence. At the beginning of adolescence, a rapid 10- to 15-pound weight gain without corresponding gain in height might indicate the need to see the individual again within 4 to 6 weeks. Nutritional treatment at this point should focus on energy expenditure rather than on cutting down the food intake. If a weight gain continues over several months, reduction in kilocalorie intake may be advisable.

Table 6–1 Mean Heights and Weights and Recommended Energy Intake for the 7- to 14-Year-Old

Age and Sex Group	Weight kg	Weight lb	Height cm	Height in	Energy Needs MJ*	Energy Needs Kcal	Energy Range in Kcal
7-10 years	28	62	132	52	kg x 10.1	2,400	1,650-3,300
11-14 years, male	45	99	157	62	kg x 11.3	2,700	2,000-3,700
11-14 years, female	46	101	157	62	kg x 9.2	2,200	1,500-3,000

*MJ = megajoule = 1,000 kJ. 1 kcal = 4.184 kJ.

Adapted from National Academy of Sciences. *Recommended Dietary Allowances*. Ninth Edition (1980), Washington, DC.

Table 6–2 Recommended Dietary Allowances for the 7- to 14-Year-Old

	7-10 Years	11-14 Years Male	11-14 Years Female
Protein (gm)	34	45	46
Vitamin A (μg R.E.)[a]	700	1,000	800
Vitamin D (μg)[b]	10	10	10
Vitamin E (mg α T.E.)[c]	7	8	8
Vitamin C (mg)	45	50	50
Thiamin (mg)	1.2	1.4	1.1
Riboflavin (mg)	1.4	1.6	1.3
Niacin (mg N.E.)[d]	16	18	15
Vitamin B_6 (mg)	1.6	1.8	1.8
Folacin (μg)	300	400	400
Vitamin B_{12} (μg)	3.0	3.0	3.0
Calcium (mg)	800	1,200	1,200
Phosphorus (mg)	800	1,200	1,200
Magnesium (mg)	250	350	300
Iron (mg)	10	18	18
Zinc (mg)	10	15	15
Iodine (μg)	120	150	150

[a]Retinol Equivalents: 1 R.E. = 1 μg retinol
[b]Cholecalciferol: 10 μg cholecalciferol = 400 IU vitamin D
[c]α T.E. = 1 mg d-α-tocopherol = 1 α T.E.
[d]1 N.E. = 1 mg niacin or 60 mg dietary tryptophan

Adapted from National Academy of Sciences. *Recommended Dietary Allowances*. Ninth Edition (1980), Washington, DC.

Triceps skinfold measurements are difficult to interpret. In group data obtained in the National Health Examination Survey, it was found that triceps skinfolds of girls leveled off between 10 to 12 years of age and then increased steadily through 17 years. In boys, triceps skinfolds decreased steadily from 12 through 16 years of age. These data reflect patterning differences of adipose tissue in the male and female. Because the data represent group data, they may not directly apply to the individual.[25] See Table 6–3 for triceps skinfold measurements at various percentile levels for males and females at different ages.

Seltzer and Mayer[24] established triceps skinfold for various age groupings as criteria for defining obesity (Table 6–4). The levels set are indicative of obesity. It must be noted, however, that the data used to set these criteria were data on Caucasian subjects only. Different races are known to have different distributions of adipose tissue; Caucasians tend to have a greater median skinfold than do blacks.[25] Skinfold thickness data have not been established for non-Caucasians.

The females' energy needs peak early in adolescence and drop later in the teen years; energy allowance for males peaks in the late teen years and early twenties (Table 6–1). These allowances reflect general trends in adolescent growth patterns. The energy needs of an individual can vary considerably from what is recommended. Individ-

Table 6–3 Percentiles for Triceps Skinfold for Whites of the Ten-State Nutrition Survey of 1968-1970

Age Group (years)	Triceps Skinfold Percentiles (mm) Males					Females				
	5th	15th	50th	85th	95th	5th	15th	50th	85th	95th
0.0–0.4	4	5	8	12	15	4	5	8	12	13
0.5–1.4	5	7	9	13	15	6	7	9	12	15
1.5–2.4	5	7	10	13	14	6	7	10	13	15
2.5–3.4	6	7	9	12	14	6	7	10	12	14
3.5–4.4	5	6	9	12	14	5	7	10	12	14
4.5–5.4	5	6	8	12	16	6	7	10	13	16
5.5–6.4	5	6	8	11	15	6	7	10	12	15
6.5–7.4	4	6	8	11	14	6	7	10	13	17
7.5–8.4	5	6	8	12	17	6	7	10	15	19
8.5–9.4	5	6	9	14	19	6	7	11	17	24
9.5–10.4	5	6	10	16	22	6	8	12	19	24
10.5–11.4	6	7	10	17	25	7	8	12	20	29
11.5–12.4	5	7	11	19	26	6	9	13	20	25
12.5–13.4	5	6	10	18	25	7	9	14	23	30
13.5–14.4	5	6	10	17	22	8	10	15	22	28
14.5–15.4	4	6	9	19	26	8	11	16	24	30
15.5–16.4	4	5	9	20	27	8	10	15	23	27
16.5–17.4	4	5	8	14	20	9	12	16	26	31

Adapted from Frisancho, A.R.: "Triceps Skin Fold and Upper Arm Muscle Size Norms for Assessment of Nutritional Status." *American Journal of Clinical Nutrition*. 27:1052, 1974.

Table 6–4 Obesity Standards for Caucasian Americans

Age (years)	Skinfold measurements* Males (mm)	Females (mm)
5	12	14
6	12	15
7	13	16
8	14	17
9	15	18
10	16	20
11	17	21
12	18	22
13	18	23
14	17	23
15	16	24
16	15	25
17	14	26
18	15	27
19	15	27
20	16	28
21	17	28
22	18	28
23	18	28
24	19	28
25	20	29
26	20	29
27	21	29
28	22	29
29	23	29
30–50	23	30

*Minimum triceps skinfold thickness in millimeters indicating obesity

Figures represent the logarithmic means of the frequency distributions plus one standard deviation.

Adapted from Seltzer, C.C., and Mayer, J.A. "Simple Criterion of Obesity." *Postgraduate Medicine*, 28:A101–107, 1965.

Table 6–5 Suggested Caloric Allowances per Pound or per Kilogram of Body Weight

Age (years)	Male Kcal/lb	Male Kcal/kg	Female Kcal/lb	Female Kcal/kg
11–14	27.3	60	21.8	48
15–18	19.0	42	17.3	38
19–22	18.6	41	17.3	38

From *Recommended Dietary Allowances* Ninth Edition (1980), with the permission of the National Academy of Sciences, Washington, DC.

ual variations depend upon physiological age, maturation, rate of growth, activity level, and size. When there is need to make a recommendation for kilocalorie intake, it is helpful to know suggested allowances that can be more adaptable to the individual than use of the RDA. Use Table 6–5 for determining individual adolescent kilocalorie requirements.

For a complete discussion of nutritional status assessment, techniques, interpretation, and use, you may wish to refer to Module 2 on appraisal of nutritional status.

In order to evaluate the adolescent's nutritional progress through the adolescent growth spurt, the following procedures are recommended:

Measure at each visit:
- **weight**
- **height**
- **triceps skinfold thickness**

Include a visual assessment of appearance, noting physical maturity and the degree of adiposity and leanness.

Table 6–6 Approximate Energy Cost of Various Exercises and Sports

Sport or Exercise	Total Kilocalories Expended Per Minute of Activity
Climbing	10.7-13.2
Cycling 5.5 mph	4.5
9.4 mph	7.0
13.1 mph	11.1
Dancing	3.3-7.7
Football	8.9
Golf	5.0
Gymnastics	
Balancing	2.5
Abdominal exercises	3.0
Arms swinging, hopping	6.5
Rowing 51 strokes per minute	4.1
87 strokes per minute	7.0
97 strokes per minute	11.2
Running	
Short distance	13.3-16.6
Cross Country	10.6
Tennis	7.1
Skating (fast)	11.5
Skiing, moderate speed	18.6
Swimming	
Breaststroke	11.0
Backstroke	11.5
Crawl (55 yards per minute)	14.0
Wrestling	14.2

From American Alliance for Health, Physical Education, and Recreation: *Nutrition for Athletes*. 1971, p. 26. Used with permission of American Alliance for Health, Physical Education, and Recreation, © 1971, Washington, DC.

Often the first indicator of nutritional imbalance is perceived visually. The eye can easily identify the need for a gain in weight in an extremely thin adolescent. Adiposity also can be easily seen.

Physical maturity is assessed by the progressive changes in the pubic hair escutcheon, which is especially useful in assuring that athletic contestants competing in team sports are of matched maturity.

A normal increase in appetite occurs during the adolescent growth spurt, and kilocalorie intake usually increases. Physical activity may or may not increase during adolescence. If kilocalorie intake is much greater than kilocalorie expenditure, excess fat will be deposited. In this case, it would be more desirable to upset the kilocalorie balance in the direction of increased output by encouraging exercise than it would be to decrease nutrient intake. Nutrient intake during adolescence is very important for maintenance of growth and development. Encouraging an adolescent to become involved in an athletic activity or some other form of physical activity will probably help socialization at the same time it is creating an opportunity to expend more energy.

Table 6–6 illustrates the kilocalorie expenditure of various physical activities. These may be activities which you should suggest your patients engage in to increase their kilocalorie expenditure.

Let us stop at this time and review an important concept concerning kilocalorie requirements of adolescents.

Test Your Knowledge

Question 1

Calculate the kilocalorie allowance for a 17-year-old female who weighs 120 pounds (55 kilograms) and for a 17-year-old male weighing 150 pounds (68 kilograms). (Use Tables 6–1 and 6–5 in this module.) Briefly explain the differences in allowances. Answers are later in this module.

_____ kilocalories for the female

_____ kilocalories for the male

Protein

Protein needs vary with age and sex. Good sources of protein are needed to obtain the required intake of essential amino acids. Essential amino acids are best provided by animal products such as milk, eggs, and meat. Vegetable proteins and grain proteins do not individually contain all the dietary essential amino acids. They do, however, contribute to the amino acid intake, and they can provide all essential amino acids if properly combined.

Requirements for protein actually represent requirements for amino acids and nitrogen. Once the requirement for essential amino acids in the diet is met, any sources of amino nitrogen can satisfy the requirement of nitrogen for synthesis of non-essential amino acids and other nitrogenous substances. Only about 20% of the required total nitrogen must be from essential amino acids.[8] Essential amino acids are amino acids that cannot be synthesized in the human body at all or that cannot be synthesized fast enough to meet the human's needs. Therefore, they must be consumed in food. Essential amino acids are most readily available in amounts similar to required amounts in foods of highest biological value such as eggs, milk, and meat.

Protein allowances for children and adolescents are calculated according to information on growth rates, body composition, and protein utilization in adults.[8] Protein allowances for the adolescent male are 1 gram per kilogram body weight per day (or 0.45 gram per pound body weight per day). In late adolescence, the allowance drops to the adult recommendation of 0.8 gram per kilogram body weight per day (0.35 gram per pound body weight per day).

The allowance for female adolescents drops from approximately 0.9 gram per kilogram body weight per day in the 11- to 15-year-old age range to the 0.8 gram per kilogram body weight per day by the 19- to 22-year-old age range. During pregnancy, and particularly during adolescent pregnancy, requirements for protein increase substantially. In addition to the growth of the female body, fetal growth demands are great for protein. The recommended allowance for the pregnant female between 15 and 18 years of age is approximately 1.5 grams per kilogram body weight per day (0.68 gram per pound body weight per day).

Protein nutriture of an individual depends on the individual's kilocalorie intake as well as the quantity and quality of protein consumed. If kilocalories consumed are less than those expended, protein will be catabolized; the carbon structure of protein will be used to form needed energy (ATP). Thus, energy adequacy is an important aspect of protein utilization.[8]

Table 6–7 contains a list of foods which provide the recommended protein allowance for adolescent males and females.

It is fairly easy to satisfy the RDA for protein; in fact, consuming foods in accordance with The Daily Food Guide insures adequate protein intake for the adolescent. For the adolescent, The Daily Food Guide recommends the following amounts:

Milk:	four 1-cup servings daily
Meat:	two 2- to 3-ounce servings daily
Fruit:	two ½-cup servings daily with 1 serving of citrus fruit daily
Vegetables:	two ½-cup servings daily with a dark green, leafy or orange-yellow vegetable every other day
Bread:	four 1-slice or ½-cup servings daily.

The consumption of foods in the amounts recommended in the Guide supplies 70 to 75 grams of protein, which is 14 to 19 grams greater than the adolescent's RDA for protein.

With the increasing number of meals consumed at fast-food restaurants, let us look at the protein intake of a typical meal consumed by an adolescent.

Food	Grams Protein
McDonald's Quarter Pounder with Cheese	34
McDonald's French Fries	3
McDonald's Chocolate Shake	11
	48

This 48-gram protein meal meets the RDA for protein for the adolescent female, and with another cup of milk sometime during the day, it meets the RDA for protein for the adolescent male.

Animal protein in the American diet is eaten in combination with breads and vegetables which also provide protein. Vegetable protein and grain protein are relegated to a position of second best in protein quality. The reason is that vegetable protein and grain protein do not individually contain all the essential amino acids required by the human. The particular amino acids of concern are methionine, cystine, and lysine. Legumes are high in lysine but low in methionine and cystine; grains are high in methionine and cystine but low in lysine. It is therefore possible to get enough essential amino acids from vegetables and grains by consuming vegetable and grain proteins that complement each other.

A well-planned vegetarian diet is an example of the adequacy of complementary proteins. In vegetarian diets, beans such as soybeans and grains such as wheat combine to supply all the essential amino acids. Legumes and grains should be eaten daily to most effectively complement each other.

The average individual in our society eats an adequate supply of essential amino acids by eating animal products. Thus, the quality of protein provided by vegetable proteins is not of concern. It becomes a concern, however, when an individual is a vegetarian, especially a vegan who consumes only fruits, vegetables, and grains but no milk, eggs, or meats.

When an individual's intake is restricted primarily to vegetables as in the case of the strict vegan, nutritional problems can become complex unless several nutritional requirements are met. Such individuals should be referred to a clinical dietitian for individual counseling. Let us review again.

Test Your Knowledge

Question 2

Calculate the protein allowance for a 14-year-old girl who weighs 53 kilograms (117 pounds) and for a 15-year-old boy who weighs 60 kilograms (132 pounds).

_____ grams protein for the 14-year-old girl

_____ grams protein for the 15-year-old boy

Table 6–7 Foods of High Biological Value Which Supply the Adolescent's RDA for Protein

Food	Female RDA = 48 gm		Male RDA = 56 gm	
	Portion Size	Grams Protein	Portion Size	Grams Protein
Meat	4 oz	28	4 oz	28
Egg	1 medium	7	2 medium	14
Milk	2 cups	16	2 cups	16
		51		58

Calcium

Adolescents have a high calcium requirement because of fast bone growth. Milk and milk products are the best sources of dietary calcium.

The RDA for calcium increase from 800 milligrams for the 7- to 10-year-old to 1,200 milligrams for both the male and female during adolescence. Rapid skeletal growth is the primary reason for dramatic increases in the dietary calcium requirement. Adolescents who are rapidly growing taller and yet are not putting on large amounts of weight are at the greatest risk for inadequate calcium nutriture. The effects of poor calcium intake during adolescence may not be seen until late in adult life, being manifested in the middle to older ages as osteoporosis and osteomalacia.

Monitoring calcium nutriture is difficult. The homeostatic mechanisms maintaining serum calcium levels are complex and hormonally controlled. Serum calcium, serum phosphorus, and alkaline phosphatase may all be within normal limits with marginal nourishment. An increased need for calcium during the adolescent growth spurt and a low intake of calcium as indicated in a diet history should flag the potential for inadequate calcium nutriture. Adolescents should be encouraged to eat at least four servings daily of foods that are good sources of calcium, such as yogurt, cheese, and milk. If the adolescent expresses concern about the high kilocalorie content of these foods, encourage the use of skim milk or yogurt and cheese made from skim milk.

Closely related to calcium nutriture is phosphorus nutriture. The phosphorus allowance is set at a level equal to the allowance for calcium. Phosphorus is ubiquitous in the food supply and is present in soft drinks and animal products in especially high amounts. There has been some concern that a high intake of phosphates and/or a low intake of calcium might contribute to bone resorption leading to osteoporosis in the elderly.[10] Although wide ranges of the Ca:P ratio appear to be tolerated in the human, the recommended allowance is 1:1 for the adolescent as well as for the adult and the elderly.

The best way to avoid a low Ca:P ratio due to high phosphorus in the diet is to advise against the uses of large quantities of carbonated beverages in the diet. A good guideline for use of carbonated beverages is to limit their consumption to about 12 ounces a day. The Ca:P ratio in milk is approximately 1:1 (288 milligrams calcium to 228 milligrams phosphorus per cup of milk). For an overview of calcium and phosphorus nutrition, see Linkswiler,[15] and Harrison.[10]

Let us stop again for a quick quiz!

Test Your Knowledge

Question 3

Look at the "Nutritional Analyses of Fast Foods" in Appendix A at the back of this module, and suggest 3 good sources of calcium which adolescents frequently eat.

Iron

Most teenage girls do not get enough dietary iron. Therefore, dietary supplementation of iron is warranted.

The adequacy of iron intake is questionable among many population groups in the United States. Groups risking inadequate intake include teenage males and females. Table 6–8 presents the intakes of 127 girls from 12 to 14 years of age from a study at Purdue University.[14] In this group of girls, 65% consumed less than 66% of the RDA for iron. Nutrient intake is even more uncertain in later adolescent years, when eating patterns often become more irregular.

Adolescence is a period of stress for nutritional well-being. Males are growing rapidly and expanding blood volume, muscle mass, and respiratory enzymes. Females are also growing and beginning menstruation. Menstrual losses of iron amount to approximately 0.5 to 0.6 milligrams daily when averaged over one month.[9] However, the individual variation in women is considerable.[8]

Because adolescence is a period of stress for nutritional well-being, it would be wise to monitor iron nutriture at every possible opportunity. (This assumes that most adolescents come to your office only occasionally.) This practice would be particularly important in the teen whose eating habits are poor or marginal. (See Appendix B for good food

Table 6–8 Mean Nutrient Intake and Percent of Subjects Consuming Selected Nutrients < 66⅔% of RDA

	RDA (1974) 11–14 Years	Mean Nutrient Intake		Percent Subjects < 66% RDA
Energy	2,400	1,921 ±	639	28
Protein (gm)	44	71 ±	25	4
Calcium (mg)	1,200	1,007 ±	532	39
Phosphorus (mg)	1,200	1,258 ±	486	11
Iron (mg)	18	11 ±	4	65
Vitamin A (IU)	4,000	3,332 ±	2,988	49
Thiamin (mg)	1.2	1.2 ±	0.5	14
Riboflavin (mg)	1.2	2.0 ±	0.9	8
Niacin (mg)	16	14 ±	7	28
Ascorbic Acid (mg)	45	76 ±	71	29
Vitamin B_6 (mg)	1.6	1.24 ±	0.7	46

Adapted from Kirksey, A., Keaton, K., Abernathy, R.P. and Greger, J.L.: "Vitamin B_6 Nutritional Status of a Group of Female Adolescents." *American Journal of Clinical Nutrition*, 31:946-954, 1978.

sources of iron which you will want to recommend to the adolescent female for frequent consumption.)

Trace Minerals

A balanced diet provides the required trace minerals in amounts such that special nutritional supplements are not required to meet the growing needs of the adolescent.

The RDA are set for 3 additional minerals: magnesium, iodine, and zinc. Magnesium is a predominant cation in living cells. It and zinc are important cofactors in many enzyme systems. Iodine has a particularly important metabolic role as an integral component of the 2 thyroid hormones — thyroxine and triiodothyronine. With the characteristic surge of growth in adolescence and the corresponding increases in metabolic activity, these minerals are in greater demand than at ages prior to or after adolescence.[8]

Many other trace minerals have been identified as necessary for humans. Although no recommended dietary allowance values have been determined, safe and adequate ranges of recommended intakes for copper, manganese, fluoride, chromium, selenium, molybdenum, sodium, potassium, and chloride have been published recently by the Food and Nutrition Board of the National Academy of Sciences in the 1980 Recommended Dietary Allowances (Table 6–9).

Most diets contain all these elements in amounts such that a deficiency would be extremely unlikely. The Food and Nutrition Board, however, warns that since the toxic levels for many trace elements may be only several times usual intake, the upper intake levels for the trace elements given in Table 6–9 should not be habitually exceeded.

Table 6–9 Estimated Safe and Adequate Daily Dietary Intakes of Additional Selected Vitamins and Minerals for the Adolescent

Vitamins	
Vitamin K (μg)	50–100
Biotin (μg)	100–200
Pantothenic Acid (mg)	4–7
Trace Elements	
Copper (mg)	2.0–3.0
Manganese (mg)	2.5–5.0
Fluoride (mg)	1.5–2.5
Chromium (mg)	0.05–0.2
Selenium (mg)	0.05–0.2
Molybdenum (mg)	0.15–0.5
Electrolytes	
Sodium (mg)	900–2,700
Potassium (mg)	1,525–4,575
Chloride (mg)	1,400–4,200

From *Recommended Dietary Allowances* Ninth Edition (1980), with permission of the National Academy of Sciences, Washington, DC.

Vitamins

A balanced diet provides sufficient vitamins to meet the RDA for the normal adolescent. If, however, the adolescent is taking oral contraceptives, the diet should be supplemented with folic acid and possibly vitamin B_6.

Increased vitamin needs during adolescence have been extrapolated from the needs of other age groups. Requirements for vitamins, as for other nutrients, increase dramatically with the growth spurt. Mild vitamin deficiencies are not uncommon in adolescence because of idiosyncratic eating practices and increased metabolism.[16]

If the diet provides adequate kilocalories and is composed of a variety of foods from the four basic food groups, it is unlikely that an individual will have inadequacies of any vitamin. If there is doubt about the adequacy of the diet, it would be wise to supplement the diet with a multivitamin preparation designed to give no more than the RDA levels of all vitamins.

Utilization of folic acid and vitamin B_6 may be impaired when oral contraceptives are taken. The oral contraceptive user's diet is frequently supplemented with these vitamins. Oral contraceptives affect tryptophan metabolism in a way that may be reversed by pyridoxine supplementation. Other vitamins and minerals that may be negatively affected by oral contraceptives include riboflavin, ascorbic acid, magnesium, and zinc. Therefore, many physicians prefer to supplement the oral contraceptive user's diet with a multivitamin and mineral supplement supplying 100% of the RDA for vitamins and minerals. Absorption of iron, calcium, and copper is enhanced with oral contraceptive use.

Vitamin A

Use of large doses of Vitamin A to treat acne is poor medical practice.

Vitamin A is required for growth, reproduction, vision, and maintenance of life. The only clearly defined biochemical role for vitamin A is in the visual cycle.[23] The biochemical role of vitamin A in maintenance of the epithelium is not clearly understood. It is also not clear whether the effects on acne are nutritional or pharmacological in nature.

Vitamin A in the retinoic acid form has become an issue in medical care of the adolescent because of recent successes in treating some forms of acne. Retinoic acid has been used alone topically and with oral antibiotics to successfully treat *acne vulgaris*.[12,19] Further research with retinoic acid and acne was recently conducted on persons with cystic and conglobate acne, two types very resistant to traditional treatments. Peck et al., in 1979, studied the use of oral 13-cis-retinoic acid on 14 patients.[21] The acne remained cleared for 20 months after discontinuation of therapy. The authors felt the effect probably had to do with direct inhibition by the drug on the sebaceous glands. There were no toxic effects except mild hepatic dysfunction.

Use of large doses (50,000 IU) of oral vitamin A as done in the past to treat acne should be discouraged; the possibility of toxicity with this approach is high, and the development of pseudotumor cerebri is not uncommon. Treatment of acne by other diet manipulations such as by avoiding chocolate, fried foods, whole milk, ice cream, and salty foods (such as nuts and other foods) is without proven beneficial effect. You should encourage good eating practices; selecting a variety of foods, receiving adequate rest and relaxation, plus not squeezing the pimples are appropriate suggestions for the individual with troublesome acne.

Nutritional Needs of the Athlete

The athlete's only increased dietary needs are for water, kilocalories, and electrolytes. A well-balanced diet provides all the nutrients an athlete requires.

Body Composition and Energy

Just as some adolescents gain excessive weight during their adolescent years, some adolescents at the other extreme may restrict their kilocalorie intake. One example is the wrestler trying to "make

weight." Zambraski et al.[26] found wrestlers losing from 9% to 20% of their body weight in order to qualify at lower weight classes. "Making weight" includes dehydration as well as following a hypocaloric regimen. The American Medical Association Committee on Medical Aspects of Sports[6] established the following guidelines to avoid damaging young wrestlers' physiological well-being:

1. The wrestler should have 7% to 10% body fat.
2. There should be a six-week conditioning period with no regard for weight.
3. The wrestler's weight at the end of this conditioning period should be used as a minimum effective weight for competition.

In addition to these guidelines, it is useful to know that weight loss of more than 4 pounds per week results in the loss of muscle mass in the amount of loss over 4 pounds. Also a weight loss of over 10% of body weight results in loss of isometric strength, most pronounced in the flexor muscles of the elbow.

Screening the male wrestler for optimal body fat is possible with the proper skinfold caliper measurements. Table 6–10 contains recommendations of skinfold measurements for male athletes. These standards are easily monitored, and the body composition of the athlete is readily assessed.

An alternative method of taking skinfold measurements with a nomogram is useful for the team physician in determining minimum wrestling weight at 7% fat, when called on to make this determination for each member of a wrestling team. This method is described in Appendix C.

Mathews and Fox[18] have summarized an average fat composition of athletes participating in a variety of sports. The data are presented in Table 6–11.

The athlete may need 3,000 to 4,000 more kilocalories daily than when not exercising to meet his energy needs for sports participation. During periods of exercise, adenosine triphosphate (ATP) and phosphocreatine provide energy. These first sources are exhausted in a matter of minutes, and then muscle and liver glycogen is used for energy. The last source of energy used is adipose tissue, which a highly conditioned athlete utilizes efficiently.

Through a well-designed nutritional program, glycogen stores can be increased by the glycogen-loading technique. Eating a high-carbohydrate diet for a week will increase glycogen stores. Glycogen stores can be increased even further if, during the week before the event, the athlete takes a very low-carbohydrate diet (100 grams daily) and exercises vigorously for two days, then takes a very high-carbohydrate diet for two to three days. In this way, glycogen stores are at first depleted and then restored to an even higher level. It

Table 6–10 Classification of Skinfold Measurements for Male Athletes

Classification	Triceps (mm)	Scapular (mm)	Abdomen (mm)	Total (mm)
Lean 7% fat	< 7	< 8	<10	<25
Acceptable 7%-15% fat	7-13	8-15	10-20	25-48
Overfat 15% fat	>13	>15	>20	>48

From Buskirk, E.: "Nutrition for the Athlete," in Ryan, A. and Allman, F. (Eds.). *Sports Medicine*. New York, Academic Press, 1974, p. 146. Used with permission of Academic Press, © 1974, New York, NY.

Table 6–11 Average Percent Body Fat Among Athletes*

	Male	Female
	% body fat	% body fat
Track	4-9.6	12-18
Gymnastics	4.6	9-17
Swimming	7.9	19-26
Basketball	7.9-14.2	24
Football	7.9-14.5	
Baseball	12-14.2	

*Values reported from a number of studies.

From Mathews, D.K. and Fox, E.L.: *The Physiological Basis of Physical Education and Athletes*. 2nd ed. Philadelphia, W.B. Saunders Co., 1976, p. 420, © 1976 by the W.B. Saunders Co. Reprinted by permission of Holt, Rinehart, & Winston.

should be noted that this technique should not be routinely practiced by athletes, as it does appear to have many side effects, including muscle damage due to over hydration. Glycogen loading appears to be helpful in those sports requiring prolonged continuous performance. Because of its limitations and risks, glycogen loading is highly controversial and is not widely practiced.

Protein

The protein needs of the athlete are not significantly different from the protein needs of the non-athlete.

Problems associated with protein intake in the teenager often are problems of excess rather than inadequacy. An example is the athlete who consumes powdered protein supplements above and beyond an already high-protein intake. The belief that encourages the sale of powdered protein supplements is the mistaken notion that "if muscles are made of protein, then eating more protein will build more muscle." Coaches are known to have misconceptions about the role of protein in building muscle mass and frequently perpetuate this belief and practice. Excess protein, beyond the requirements for essential amino acids and nitrogen, is catabolized to the same carbon pool to which carbohydrate and fat contribute. In other words, the athlete can get fat by eating excess protein just as by eating excessive carbohydrate and fat.

Excessive protein intake also results in a high solute load of nitrogen for the kidneys. Couple excessive nitrogen excretion with dehydration which is encouraged in "making weight" in wrestling, and the result is a potential problem for the athlete's kidneys.

A similar high-solute load can occur with low-carbohydrate, high-protein, weight-loss diets. Generally, healthy kidneys can handle the excessive solute load, but an individual with diminished kidney function risks exacerbating the condition with excessive protein and inadequate fluid intake.

Fluid and Electrolytes

Fluid intake in the exercising and training individual is essential. Use of water and fruit juices to replace electrolytes and fluid losses from sweating is more appropriate and less expensive than commercial replacements.

Fluid is at times ignored as a vital nutrient. It is nonetheless an essential nutrient for health and life. Normally, the human body is well balanced with homeostatic mechanisms that keep hydration under close control. Problems that arise in adolescence with fluid balance frequently are self-imposed; this phenomenon is most vividly seen in the wrestler "making weight." It happens when the wrestler chooses to reduce his weight rapidly so that he will weigh-in for competition just under the mark for the desired weight class. Hursch[13] has recommended that the specific gravity of urine be used as a criterion for weight to discourage the practice of dehydration for "making weight." The specific gravity recommended is approximately 1.015.

Water deficits of a few percentage points are incompatible with life. Even the loss of as little as 3% of total body water results in the dehydration-exhaustion syndrome and decreased work and exercise performance. Water imbalances without

corresponding electrolyte changes can lead to osmotic changes that interfere with cellular function. Both fluid and electrolytes are lost with sweating; the degree of perspiration depends on environmental temperature, humidity, individual physiological differences, wind velocity, and physical activity. Too frequently, healthy persons die from heat exposure. All too often the victims are young athletes exerting themselves in summer temperatures. At no time should access to water be limited during physical exercise and training.

It has been recommended[20] that certain precautions be taken to decrease the chances of heat illness. Before practice or before the game begins, the wet bulb temperature should be measured.

If it reads

under 60°, no precautions are necessary.
61°–66°, be alert to observe athletes who have heavy weight loss.
67°–72°, insist that water be given on field.
73°–77°, alter practice schedule to provide a light practice routine.
over 78°, cancel or postpone practice.

It is advised that weight be monitored before, during, and after exercise and practice sessions on hot days. A dramatic drop in weight indicates the need for immediate rehydration. Use of sodium and potassium tablets may be necessary in heavy perspiration losses, but they must be used with caution. Highly salted table foods will more than likely provide all the electrolytes needed by the athlete. Taking salt tablets, especially if access to water is limited, is a dangerous practice. Fruit juice is a good source of fluid and potassium. Specially designed fluid-electrolyte replacement drinks are of no more value than water or juices in preventing heat stroke.

The Weight Conscious Female Adolescent

During teenage female examinations, stress the need for adequate exercise and a well-balanced diet. Be wary of the "too slim" as well as the "too fat" adolescent female.

Weight consciousness is a particular concern of the young woman. The desire to be fashionably slim can endanger nutritional status. Young women should be taught to focus on reduction of fat rather than just reduction of weight. Exercise and use of muscle is a natural outgrowth of this type of weight-reduction plan. Female athletes are leaner than non-athletic females. This knowledge might help female adolescents plan healthy weight-reduction goals.

A very treacherous outgrowth of the adolescent pressure toward slimness is anorexia nervosa. Anorexia nervosa is both a psychological problem and an eating disorder. It is characterized by misperceptions of body image, starvation, and binge-eating with subsequent use of laxatives or self-induced vomiting. You must know how to diagnose the patient with anorexia nervosa, as the condition is dangerous and potentially fatal if not reversed. It is unfortunate that society's concern for slimness contributes to the incidence of the disorder. Hilde Bruch's books *Eating Disorders*[2] and *The Golden Cage*[3] contain excellent discussions of anorexia nervosa and other eating disorders.

Adolescence is an excellent and appropriate time for nutrition education, especially with regard to weight control. During rapid growth, large appetites create eating habits that do not fit the slower metabolism which characteristically follows the adolescent years. The football player out of high school must cut down his intake when he settles into a sedentary job. If he decides not to decrease his kilocalorie intake, he must keep up his physical activity or pay the price of weight gain. *In support of physical activity for all persons, it appears that physical activity may be an important key to avoiding many chronic illnesses in later life.*

Nutrition Counseling for the Adolescent

Because the adolescent life style will challenge good nutrition practices, you and your office team should use the routine high school examination time to discuss good nutrition concepts and the components of a balanced, varied diet with your adolescent patients.

During adolescence, eating is an important way of socializing with other people. Peers meet and have pizza, "hanging out" at local eating establishments to be together. It is a time of diminished family influence over direct food intake. Patterns that have been formed through family eating habits will always remain with an individual and influence food choices. However, during adolescence, peer pressure often takes precedence over former habits. Increased activity away from home

- Increases the likelihood of missing meals.
- Increases snacking.
- Often limits availability of varied food choices.

With high energy needs during adolescence, snacking can be an important source of needed nutrients. Teen-agers eat about one-third to one-quarter of their total kilocalories as snacks, which contribute significantly to their nutrient intake. With a little guidance in selecting foods that contain vitamin A, ascorbic acid, iron, and calcium, the teen-ager's diet could easily be improved within the snacking pattern. Adolescence can also be a time when the individual develops habits and tastes for high-kilocalorie, low-nutrient dense foods (often called "junk" foods). Soft drinks are examples of high-kilocalorie, low-nutrient dense foods. A soft drink can provide the needed kilocalories to a fast-growing youth; however, if fat tissue is all that is growing, soft drinks should be eliminated from the diet.

Nutritional counseling during adolesence should help prevent the formation of inappropriate eating behavior. The adolescent's characteristic drive for autonomy can be an advantage if handled properly in teaching the adolescent. Adolescents are anxious to test their new independence and are appreciative of being treated in a manner that gives them choices and a part in decision making and goal setting. Suggestions for change should come from a mutual exchange with explanation and a rationale. When given the information needed to improve one's own diet, the teen-ager is apt to convince himself of the relationships between good nutrition and appearance, energy, growth, and development. Appearance is important to adolescents. Teen-age leaders who exemplify good nutritional appearance are more effective counselors with their peers than are adults.

Improving the poor self-image that the obese adolescent has may be the first step in treatment. With the increased development of self-confidence, determination to change physical appearance will motivate the adolescent through the long and difficult struggle with weight control.

The family should be included in counseling sessions so they can offer support; however, meeting separately with the family is often better than meeting with the adolescent and the family together. The teen-ager must be the one responsible for food intake. It is possible to help the whole family improve eating habits while you are treating the adolescent! Of major importance, it is well to remember that it is essential to respect the adolescent's individual views. A dictatorial approach to counseling is doomed to failure.

Good luck in counseling your adolescent patients. The rewards for a job well done may not be realized immediately or even in 10 years, but your efforts should have a positive impact on the health of adolescents when they become adults in middle and later life.

Test Your Knowledge

The following are mini-care studies for providing nutritional care to adolescents. Suggested answers are at the back of this module.

Scenario 1

A 15-year-old girl has come to your office accompanied by her mother. As you enter the room, they are exchanging sharp words with each other, but stop abruptly.

The mother informs you that her daughter Jean has the foolish idea that she needs diet pills to lose weight and that is why they came to you. The daughter looks irritated by her mother's comment.

You ask the daughter to step into the hall to measure her weight, height, and triceps skinfold. Her measurements are as follows:

Height: 5 feet 5 inches (her parents' heights are 5 feet 3 inches and 5 feet 8 inches)
Weight: 127 pounds (ideal or desirable is 120 to 130 pounds)
Skinfold: 24 mm (according to the Ten-State Nutrition Survey, Table 6–3 in this module, Jean is in the 85th percentile for triceps skinfolds)

Jean states that she just started gaining weight and does not want to be fat like her mother and sisters. When asked why she gained weight, she said that maybe it was hereditary. As you talk you find out the following information:

Activity: Jean was a runner in junior high and had given it up for more study time.
Meals: Jean started skipping breakfast as the school bus comes early and she is not hungry. She eats lunch at Burger Chef. She is active in clubs that get her home past the dinner hour.

Usual Lunch:	**Carbohydrate (gm)**	**Protein (gm)**	**Fat (gm)**	**Kilocalories**
Skipper's Treat	47	21	37	605
Shake	47	11	11	331
French Fries	25	3	9	193
	119	35	57	1,129

Question 1

List at least 3 medical and interactional problems that are apparent to you, and discuss how you would begin to work on them.

Scenario 2

A 16-year-old male you have seen recently for a physical examination for football called to ask a couple of questions. The questions are as follows:

1. What protein supplement should I take to increase muscle mass?
2. Should I take vitamins to cure my pimples?

You check your records and see that John is at his expected weight for height and remember him to be well built. His acne was not serious medically.

You ask him to identify a typical 24-hour-intake and bring it by for you to see. That afternoon he brings you the following intake:

Breakfast
2 eggs
2 slices of toast
12-ounce glass of whole milk

10:00 am
12 ounces of Coke
pastry

Lunch
1 Quarter Pounder with cheese
1 large French fries
1 cherry pie
12-ounce chocolate shake

Afternoon
8 ounces Dutch apple yogurt
¼ pound of cheddar cheese
8 ounces of milk

Dinner
1 fried chicken breast and
2 fried chicken legs
1 cup mashed potatoes with gravy
¾ cup green beans
large bowl of salad (lettuce)
12 ounces of milk
large serving of apple pie with
ice cream

Question 1

Without analyzing the intake in detail, what would you say to John about his protein intake?

Question 2

If you look at the types of food John eats, do you feel the variety is adequate? If not, what changes would you suggest?

Question 3

How would you answer his question about vitamins for his acne?

Question 4

In your own words, define "junk" foods. Discuss the role of fast foods and "junk" foods in the adolescent diet.

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Resources for the Patient

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Deutsch, R.M.: *The Family Guide to Better Food and Better Health*. Des Moines, IA, Meredith Corporation, 1971.

Katch, F.I. and McArdle, W.D.: *Nutrition, Weight Control, and Exercise*. Boston, Houghton-Mifflin, 1977.
Written at a college graduate level, specialized for coaches and athletes.

Smith, W.J.: *Food for Sport*. Palo Alto, CA, Bull Publishing, 1976.
This book is readable and contains some technical information. It is written from a knowledge of questions athletes of all ages have asked, and is designed to help build a solid understanding of nutrition in pursuit of athletic performance and good health.

Answers

Question 1

You should have given the following answer:
2,136 to 2,145 kilocalories for the female.
3,332 to 3,345 kilocalories for the male.
Males have more muscle tissue requiring a higher energy intake to maintain. Males are larger and still growing at 17 years of age, while a female's growth has slowed by age 17 years.

Question 2

You should have given the following answers:
48 grams protein for the female (53 kilograms × 0.9 gram protein per kilogram body weight)
60 grams protein for the male (60 kilograms × 1.0 gram protein per kilogram body weight)

Question 3

Any suggestion including milk or milk products would substantially contribute to the calcium intake of the adolescent: Quarter Pounder with cheese, milkshake, milk, cheeseburger, ham and cheese, ice cream, pizza with cheese, tostada, and enchirito are some examples.

Scenario 1

Answer 1

Possible issues and suggestions for discussion with Jean and her mother include the following:

1. Jean misunderstands the reason for gaining weight. Reinforce typical changes of the adolescent growth spurt.
2. Jean's energy output has recently decreased. Encourage her to resume her daily running routine.
3. Jean's high-kilocalorie lunch might reflect hunger from skipping breakfast and a tendency to favor high-kilocalorie foods.
4. Mother is insensitive to Jean's ideas. Encourage the mother to support Jean's typical adolescent feelings.
5. Jean's weight is close to ideal for her height and genetic potential, but her triceps skinfold is a little higher than average. If Jean exercises routinely, her lean body mass should increase, and her adipose tissue might decrease.
6. Jean is motivated to keep her weight down. Encourage Jean to continue watching her weight.

Scenario 2

Answer 1

John's food intake is varied; he eats the recommended number of meat servings from The Daily Food Guide and consumes enough kilocalories to support weight gain. His protein intake is more than adequate. The addition of protein powder would be unnecessary and would be expensive. In your explanation, you should be sensitive to his reaching out to you with the knowledge he has learned and the information he believes. He should hear *why* you feel the way you do. Be careful not to put his idea down or make him feel foolish for asking. He obviously respects your opinion. It might be a chance to help bridge his understanding of protein nutrition and some lessons in biology he might have had in school.

Answer 2

The variety of food John has eaten this day is fairly good. Vegetables and fruits could be increased to insure the adequacy of his diet.

Answer 3

Vitamin A is a fat-soluble vitamin that is toxic at high levels of intake. If he has been investigating the availability of powdered protein, chances are he has been to health food stores. He may have connected acne and vitamins by seeing some available literature. The best nutritional care for acne is a varied diet. Presently, the use of 13-cis-retinoic acid for acne treatment has had some successes. Whether diet can affect acne through vitamin A intake is still questionable.

Answer 4

The authors' definition of "junk" food is "food that contributes little of value nutritionally to the individual's dietary intake." It usually consists of high-kilocalorie and low-nutrient dense foods. High-kilocalorie or low-nutrient dense foods may be acceptable to persons needing lots of energy and having already satisfied other nutrient requirements.

"Fast" foods are usually considered to be foods that can be purchased ready to eat and consumed in a short time. Many of these foods have high-nutritional value. The typical problem with them is that they frequently are high in salt, carbohydrate, and fat and are low in vitamins A and C. Eating continually from vending machines and fast-food restaurants might limit an individual's intake of the vitamins and minerals most readily available from fruits and vegetables. Careful planning can supplement these fast foods (e.g., tomato juice, fresh fruit from the grocery, and salads that are sometimes available) with foods easily purchased and eaten "on the run."

Appendix A

Nutritional Analyses of Fast Foods

	Wt (g)	kcal	PRO (g)	CHO (g)	FAT (g)	Chol (mg)	Vit A (IU)	Vit B_1 (mg)	Vit B_2 (mg)	Nia (mg)	Vit B_6 (mg)	Vit B_{12} (μg)	Vit C (mg)	Vit D (IU)	Ca (mg)	Cu (mg)	Fe (mg)	K (mg)	Mg (mg)	P (mg)	Na (mg)	Zn (mg)	Mois-ture (mg)	Crude Fiber (mg)
BURGER CHEF																								
Big Shef	186	542	23	35	34	-	282	0.34	0.35	5.4	-	-	2	-	189	-	3.4	384	-	278	622	-	-	0.3
Cheeseburger	104	304	14	24	17	-	266	0.22	0.23	3.2	-	-	1	-	156	-	2.0	220	-	198	535	-	-	0.2
Double Cheeseburger	145	434	24	24	26	-	430	0.25	0.34	4.8	-	-	1	-	246	-	3.1	361	-	351	691	-	-	0.2
French Fries	68	187	3	25	9	-	tr	0.09	0.05	2.1	-	-	14	-	10	-	0.9	581	-	76	4	-	-	0.7
Hamburger, Regular	91	258	11	24	13	-	114	0.22	0.18	3.2	-	-	1	-	69	-	1.9	210	-	102	393	-	-	0.2
Mariner Platter	373	680	32	85	24	-	448	0.37	0.40	7.3	-	-	24	-	137	-	4.7	1278	-	396	882	-	-	1.5
Rancher Platter	316	640	30	44	38	-	367	0.30	0.37	8.7	-	-	24	-	57	-	5.1	1370	-	326	444	-	-	1.3
Shake	305	326	11	47	11	-	10	0.11	0.57	0.3	-	-	2	-	411	-	0.2	548	-	319	167	-	-	0
Skipper's Treat	179	604	21	47	37	-	303	0.29	0.30	3.7	-	-	1	-	201	-	2.5	284	-	288	783	-	-	0.3
Super Shef	252	600	29	39	37	-	763	0.37	0.43	6.7	-	-	9	-	240	-	4.2	590	-	371	918	-	-	0.5

Source: Burger Chef Systems, Inc, Indianapolis, Ind, 1978 (analyses obtained from USDA Handbook No. 8).

BURGER KING																								
Cheeseburger	-	305	17	29	13	-	195	0.08	0.16	2.20	-	-	0.5	-	141	-	2.0	219	-	229	562	-	-	-
Hamburger	-	252	14	29	9	-	21	0.08	0.10	2.20	-	-	0.5	-	45	-	2.0	208	-	119	401	-	-	-
Whopper	-	606	29	51	32	-	641	0.20	0.26	5.20	-	-	13.0	-	90	-	6.0	653	-	272	909	-	-	-
French Fries	-	214	3	28	10	-	0	0.10	0.06	2.42	-	-	16.0		12	-	1.0	666	-	87	5	-	-	-
Vanilla Shake	-	332	11	50	11	-	9	0.10	0.54	0.27	-	-	tr	-	390	-	0.2	520	-	303	159	-	-	-
Whaler	-	745	18	69	46	-	141	0.09	0.09	1.04	-	-	1.3	-	70	-	1.0	130	-	91	735	-	-	-
Hot Dog	-	291	11	23	17	-	0	0.39	0.15	2.00	-	-	0	-	40	-	1.4	170	-	117	841	-	-	-

Source: Chart House, Inc, Oak Brook, Ill, 1978.

DAIRY QUEEN																								
Big Brazier Deluxe	213	470	28	36	24	-	-	0.34	0.37	9.6	0.38	2.55	<2.5	30	111	0.21	5.2	-	45	262	920	5.5	-	-
Big Brazier Regular	184	457	27	37	23	-	-	0.37	0.39	9.6	0.34	2.29	<2.0	31	113	0.18	5.2	-	42	223	910	5.4	-	-
Big Brazier W/Cheese	213	553	32	38	30	-	495	0.34	0.53	9.5	0.35	2.89	<2.3	36	268	0.19	5.2	-	47	359	1435	5.9	-	-
Brazier W/Cheese	121	318	18	30	14	-	-	0.29	0.29	5.7	0.11	1.20	<1.2	13	163	0.10	3.5	-	26	192	865	2.8	-	-
Brazier Cheese Dog	113	330	15	24	19	-	-	-	0.18	3.3	0.07	1.22	-	23	168	0.08	1.6	-	24	182	-	1.9	-	-
Brazier Chili Dog	128	330	13	25	20	-	-	0.15	0.23	3.9	0.17	1.29	11.0	20	86	0.13	2.0	-	38	139	939	1.8	-	-
Brazier Dog	99	273	11	23	15	-	-	0.12	0.15	2.6	0.08	1.05	11.0	23	75	0.79	1.5	-	21	104	868	1.4	-	-
Brazier French Fries, 2.5 oz	71	200	2	25	10	-	tr	0.06	tr	0.8	0.16	-	3.6	16	tr	0.04	0.4	-	16	100	-	tr	-	-
Brazier French Fries, 4.0 oz	113	320	3	40	16	-	tr	0.09	0.03	1.2	0.30	-	4.8	24	tr	0.08	0.4	-	24	150	-	0.3	-	-
Brazier Onion Rings	85	300	6	33	17	-	tr	0.09	tr	0.4	0.08	-	2.4	8	20	0.08	0.4	-	16	60	-	0.3	-	-
Brazier Regular	106	260	13	28	9	-	-	0.28	0.26	5.0	0.13	1.03	<1.0	13	70	0.11	3.5	-	23	114	576	2.3	-	-
Fish Sandwich	170	400	20	41	17	-	tr	0.15	0.26	3.0	0.16	1.20	tr	40	60	0.08	1.1	-	24	200	-	0.3	-	-
Fish Sandwich W/Cheese	177	440	24	39	21	-	100	0.15	0.26	3.0	0.16	1.50	tr	40	150	0.08	0.4	-	24	250	-	0.3	-	-
Super Brazier	298	783	53	35	48	-	-	0.39	0.69	15.6	0.69	4.97	<3.2	65	282	0.27	7.3	-	61	518	1619	10.5	-	-

Super Brazier Dog	182	518	20	41	30	-	tr	0.42	0.44	7.0	0.17	2.09	14.0	44	158	0.18	4.3	-	37	195	1552	2.8	-	-
Super Brazier Dog W/Cheese	203	593	26	43	36	-	-	0.43	0.48	8.1	0.18	2.34	14.0	44	297	0.18	4.4	-	42	312	1986	3.5	-	-
Super Brazier Chili Dog	210	555	23	42	33	-	-	0.42	0.48	8.8	0.27	2.67	18.0	32	158	0.21	4.0	-	48	231	1640	2.8	-	-
Banana Split	383	540	10	91	15	-	750	0.60	0.60	0.8	0.50	0.90	18.0	tr	350	0.20	1.8	-	60	250	-	2.3	-	-
Buster Bar	149	390	10	37	22	-	300	0.09	0.34	1.5	0.12	0.90	tr	-	200	0.16	0.7	-	60	150	-	1.2	-	-
DQ Chocolate Dipped Cone, sm	78	150	3	20	7	-	100	0.03	0.17	tr	0.04	0.36	tr	tr	100	0.04	tr	-	16	80	-	0.3	-	-
DQ Chocolate Dipped Cone, med	156	300	7	40	13	-	300	0.09	0.34	tr	0.08	0.60	tr	tr	200	0.08	0.4	-	24	150	-	0.6	-	-
DQ Chocolate Dipped Cone, lg	234	450	10	58	20	-	400	0.12	0.51	tr	0.12	0.90	tr	8	300	0.12	0.4	-	40	200	-	0.9	-	-
DQ Chocolate Malt, sm	241	340	10	51	11	-	400	0.06	0.34	0.4	0.16	1.20	2.4	60	300	0.08	1.8	-	40	200	-	1.5	-	-
DQ Chocolate Malt, med	418	600	15	89	20	-	750	0.12	0.60	0.8	0.20	1.80	3.6	100	500	0.12	3.6	-	60	400	-	3.0	-	-
DQ Chocolate Malt, lg	588	840	22	125	28	-	750	0.15	0.85	1.2	0.30	2.40	6.0	140	600	0.20	5.4	-	80	600	-	3.8	-	-
DQ Chocolate Sundae, sm	106	170	4	30	4	-	100	0.03	0.17	tr	0.04	0.48	tr	tr	100	0.08	0.7	-	24	100	-	0.6	-	-
DQ Chocolate Sundae, med	184	300	6	53	7	-	300	0.06	0.26	tr	0.08	6.00	tr	tr	200	0.12	1.1	-	32	150	-	0.9	-	-
DQ Chocolate Sundae, lg	248	400	9	71	9	-	400	0.09	0.43	0.4	0.12	1.20	tr	8	300	0.16	1.8	-	40	250	-	1.2	-	-
DQ Cone, sm	71	110	3	18	3	-	100	0.03	0.14	tr	0.04	0.36	tr	tr	100	tr	tr	-	8	60	-	0.3	-	-
DQ Cone, med	142	230	6	35	7	-	300	0.09	0.26	tr	0.08	0.60	tr	tr	200	0.04	tr	-	24	150	-	0.6	-	-
DQ Cone, lg	213	340	10	52	10	-	400	0.15	0.43	tr	0.12	1.20	tr	8	300	0.08	tr	-	32	200	-	0.9	-	-
Dairy Queen Parfait	284	460	10	81	11	-	400	0.12	0.43	0.4	0.16	1.20	tr	8	300	0.16	1.8	-	40	250	-	1.2	-	-
Dilly Bar	85	240	4	22	15	-	100	0.06	0.17	tr	0.04	0.48	tr	-	100	0.08	0.4	-	16	100	-	0.3	-	-
DQ Float	397	330	6	59	8	-	100	0.12	0.17	tr	-	0.60	tr	-	200	-	tr	-	-	200	-	-	-	-
DQ Freeze	397	520	11	89	13	-	200	0.15	0.34	tr	-	1.20	tr	-	300	-	tr	-	-	250	-	-	-	-
DQ Sandwich	60	140	3	24	4	-	100	0.03	0.14	0.4	tr	0.24	tr	-	60	0.04	0.4	-	8	60	-	0.3	-	-
Fiesta Sundae	269	570	9	84	22	-	200	0.23	0.26	tr	-	0.90	tr	-	200	-	tr	-	-	200	-	-	-	-
Hot Fudge Brownie Delight	266	570	11	83	22	-	500	0.45	0.43	0.8	0.16	0.90	tr	tr	300	0.20	1.1	-	40	250	-	1.5	-	-
Mr. Misty Float	404	440	6	85	8	-	120	0.12	0.17	tr	-	0.60	tr	-	200	-	tr	-	-	200	-	-	-	-
Mr. Misty Freeze	411	500	10	87	12	-	200	0.15	0.34	tr	-	1.20	tr	-	300	-	tr	-	-	200	-	-	-	-

Source: International Dairy Queen, Inc, Minneapolis, Minn, 1978. Dairy Queen stores in the State of Texas do not conform to Dairy Queen-approved products. Any nutritional information shown does not necessarily pertain to their products.

KENTUCKY FRIED CHICKEN																							
Original Recipe Dinner*	425	830	52	56	46	285	750‡	0.38‡	0.56‡	15.0‡	-	-	27.0‡	-	150‡	-	4.5‡	-	-	-	2285	-	-	-
Extra Crispy Dinner*	437	950	52	63	54	265	750‡	0.38‡	0.56‡	14.0‡	-	-	27.0‡	-	150‡	-	3.6‡	-	-	-	1915	-	-	-
Individual Pieces† (Original Recipe)																							
Drumstick	54	136	14	2	8	73	30	0.04	0.12	2.7	-	-	0.6	-	20	-	0.9	-	-	-	-	-	28.6	-
Keel	96	283	25	6	13	90	50	0.07	0.13	-	-	-	1.2	-	-	-	0.9	-	-	-	-	-	50.3	-
Rib	82	241	19	8	15	97	58	0.06	0.14	5.8	-	-	<1.0	-	55	-	1.0	-	-	-	-	-	37.7	-
Thigh	97	276	20	12	19	147	74	0.08	0.24	4.9	-	-	<1.0	-	39	-	1.4	-	-	-	-	-	48.3	-
Wing	45	151	11	4	10	70	-	0.03	0.07	-	-	-	<1.0	-	-	-	0.6	-	-	-	-	-	19.1	-
9 Pieces	652	1892	152	59	116	864	-	0.49	1.27	-	-	-	-	-	-	-	8.8	-	-	-	-	-	317.4	-

Source: Nutritional Content of Average Serving, Heublein Food Service and Franchising Group, June 1976.

* Dinner comprises mashed potatoes and gravy, cole slaw, roll, and three pieces of chicken, either 1) wing, rib, and thigh; 2) wing, drumstick, and thigh; or 3) wing, drumstick, and keel.

† Edible portion of chicken.

‡ Calculated from percentage of US RDA.

Nutritional Analyses of Fast Foods (continued)

	Wt (g)	kcal	PRO (g)	CHO (g)	FAT (g)	Chol (mg)	Vit A (IU)	Vit B_1 (mg)	Vit B_2 (mg)	Nia (mg)	Vit B_6 (mg)	Vit B_{12} (μg)	Vit C (mg)	Vit D (IU)	Ca (mg)	Cu (mg)	Fe (mg)	K (mg)	Mg (mg)	P (mg)	Na (mg)	Zn (mg)	Mois-ture (mg)	Crude Fiber (mg)
LONG JOHN SILVER'S																								
Breaded Oysters, 6 pc	-	460	14	58	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Breaded Clams, 5 oz	-	465	13	46	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chicken Planks, 4 pc	-	458	27	35	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cole Slaw, 4 oz	-	138	1	16	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corn on Cob, 1 pc	-	174	5	29	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fish W/Batter, 2 pc	-	318	19	19	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fish W/Batter, 3 pc	-	477	28	28	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fryes, 3 oz	-	275	4	32	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hush Puppies, 3 pc	-	153	1	20	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ocean Scallops, 6 pc	-	257	10	27	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peg Leg W/Batter, 5 pc	-	514	25	30	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shrimp W/Batter, 6 pc	-	269	9	31	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Treasure Chest 2 pc fish, 2 Peg Legs	-	467	25	27	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: Long John Silver's Seafood Shoppes, Jan 8, 1978 (nutritional analysis information furnished in study conducted by the Department of Nutrition and Food Science, University of Kentucky).

McDONALD'S																								
Egg McMuffin	132	352	18	26	20	192	361	0.36	0.60	4.3	0.14	0.71	1.6	40	187	0.11	3.2	222	25	265	914	1.7	65.3	0.4
English Muffin, Buttered	62	186	6	28	6	12	106	0.22	0.14	6.4	0.03	0.02	<0.7	8	87	0.06	1.6	66	13	94	466	0.3	20.8	0.1
Hot Cakes, W/Butter & Syrup	206	472	8	89	9	36	255	0.31	0.43	4.0	0.06	0.14	<2.1	12	54	0.11	2.4	264	30	404	1071	0.6	95.9	0.2
Sausage (Pork)	48	184	9	tr	17	43	36	0.22	0.13	5.9	0.11	0.36	<0.5	35	13	0.04	0.9	125	8	55	464	1.1	21.2	0.1
Scrambled Eggs	77	162	12	2	12	301	514	0.07	0.60	0.4	0.16	0.76	<0.8	60	49	0.06	2.2	144	11	167	207	1.4	50.6	0.2
Big Mac	187	541	26	39	31	75	327	0.35	0.37	8.2	0.22	1.89	2.4	37	175	0.15	4.3	386	38	215	962	3.9	86.4	0.7
Cheeseburger	114	306	16	31	13	41	372	0.24	0.30	5.5	0.10	0.97	1.6	14	158	0.03	2.9	244	24	134	725	2.0	51.4	0.3
Filet O Fish	131	402	15	34	23	43	152	0.28	0.28	3.9	0.08	0.78	4.2	37	105	0.07	1.8	293	29	158	709	0.7	55.9	0.7
French Fries	69	211	3	26	11	10	< 52	0.15	0.03	2.9	<0.01	0.01	11.0	<3	10	0.02	0.5	570	23	49	113	0.1	27.8	0.6
Hamburger	99	257	13	30	9	26	231	0.23	0.23	5.1	0.11	1.03	1.8	11	63	0.08	3.0	234	21	88	526	1.8	44.6	0.2
Quarter Pounder	164	418	26	33	21	69	164	0.31	0.41	9.8	0.25	2.29	2.3	23	79	0.13	5.1	442	38	179	711	4.4	81.2	0.8
Quarter Pounder W/Cheese	193	518	31	34	29	96	683	0.35	0.59	15.1	0.25	2.42	2.9	36	251	0.15	4.6	472	43	257	1209	4.8	94.2	0.8
Apple Pie	91	300	2	31	19	14	< 69	0.02	0.03	1.3	0.08	0.01	2.7	5	12	0.03	0.6	39	7	23	414	0.1	38.3	0.2
Cherry Pie	92	298	2	33	18	14	213	0.02	0.03	0.4	0.02	0.01	1.3	<5	12	0.04	0.4	57	8	23	456	0.1	38.6	0.1
McDonaldland Cookies	63	294	4	45	11	9	< 48	0.28	0.23	0.8	0.02	tr	1.4	10	10	0.03	1.4	58	10	51	330	0.2	1.9	0.2
Chocolate Shake	289	364	11	60	9	29	318	0.12	0.89	0.8	0.12	0.85	<2.9	354	338	0.17	1.0	656	51	292	329	1.3	207.0	<0.3
Strawberry Shake	293	345	10	57	9	30	322	0.12	0.66	0.5	0.11	0.85	<2.9	313	339	0.09	0.2	544	35	298	256	1.1	214.0	<0.3
Vanilla Shake	289	323	10	52	8	29	346	0.12	0.66	0.6	0.12	0.94	<2.9	354	346	0.06	0.2	499	35	266	250	1.0	216.0	<0.3

Source: "Nutritional analysis of food served at McDonald's restaurants." WARF Institute, Inc, Madison, Wisc, June 1977.

PIZZA HUT*																							
Thin 'N Crispy																							
Beef†	◦	490	29	51	19	-	750	0.30	0.60	7.0	-	-	<1.2	-	350	-	6.3	-	-	-	-	-	-	-
Pork†	◦	520	27	51	23	-	1000	0.38	0.68	7.0	-	-	<1.2	-	350	-	6.3	-	-	-	-	-	-	-
Cheese	◦	450	25	54	15	-	750	0.30	0.51	5.0	-	-	<1.2	-	450	-	4.5	-	-	-	-	-	-	-
Pepperoni	◦	430	23	45	17	-	1000	0.30	0.51	6.0	-	-	<1.2	-	300	-	4.5	-	-	-	-	-	-	-
Supreme	◦	510	27	51	21	-	1250	0.38	0.68	7.0	-	-	2.4	-	350	-	7.2	-	-	-	-	-	-	-
Thick 'N Chewy																							
Beef†	◦	620	38	73	20	-	750	0.68	0.60	8.0	-	-	<1.2	-	400	-	7.2	-	-	-	-	-	-	-
Pork†	◦	640	36	71	23	-	750	0.90	0.77	9.0	-	-	1.2	-	400	-	7.2	-	-	-	-	-	-	-
Cheese	◦	560	34	71	14	-	1000	0.68	0.68	7.0	-	-	<1.2	-	500	-	5.4	-	-	-	-	-	-	-
Pepperoni	◦	560	31	68	18	-	1250	0.68	0.68	8.0	-	-	3.6	-	400	-	5.4	-	-	-	-	-	-	-
Supreme	◦	640	36	74	22	-	1000	0.75	0.85	9.0	-	-	9.0	-	400	-	7.2	-	-	-	-	-	-	-

Source: Research 900 and Pizza Hut, Inc, Wichita, Kan.
* Based on a serving size of one half of a 10-inch pizza (3 slices).
†Topping mixture of ingredients.

TACO BELL																							
Bean Burrito	166	343	11	48	12	-	1657	0.37	0.22	2.2	-	-	15.2	-	98	-	2.8	235	-	173	272	-	-	-
Beef Burrito	184	466	30	37	21	-	1675	0.30	0.39	7.0	-	-	15.2	-	83	-	4.6	320	-	288	327	-	-	-
Beefy Tostada	184	291	19	21	15	-	3450	0.16	0.27	3.3	-	-	12.7	-	208	-	3.4	277	-	265	138	-	-	-
Bellbeefer	123	221	15	23	7	-	2961	0.15	0.20	3.7	-	-	10.0	-	40	-	2.6	183	-	140	231	-	-	-
Bellbeefer W/Cheese	137	278	19	23	12	-	3146	0.16	0.27	3.7	-	-	10.0	-	147	-	2.7	195	-	208	330	-	-	-
Burrito Supreme	225	457	21	43	22	-	3462	0.33	0.35	4.7	-	-	16.0	-	121	-	3.8	350	-	245	367	-	-	-
Combination Burrito	175	404	21	43	16	-	1666	0.34	0.31	4.6	-	-	15.2	-	91	-	3.7	278	-	230	300	-	-	-
Enchirito	207	454	25	42	21	-	1178	0.31	0.37	4.7	-	-	9.5	-	259	-	3.8	491	-	338	1175	-	-	-
Pintos 'N Cheese	158	168	11	21	5	-	3123	0.26	0.16	0.9	-	-	9.3	-	150	-	2.3	307	-	210	102	-	-	-
Taco	83	186	15	14	8	-	120	0.09	0.16	2.9	-	-	0.2	-	120	-	2.5	143	-	175	79	-	-	-
Tostada	138	179	9	25	6	-	3152	0.18	0.15	0.8	-	-	9.7	-	191	-	2.3	172	-	186	101	-	-	-

Sources: Menu Item Portions, July 1976. Taco Bell Co, San Antonio, Tex.
Adams CF: *Nutritive Value of American Foods in Common Units*. USDA Agricultural Research Service, Agricultural Handbook No. 456, November 1975.
Church CF, Church HN: *Food Values of Portions Commonly Used*, ed 12. Philadelphia, JB Lippincott Co, 1975.
Valley Baptist Medical Center, Food Service Department: Descriptions of Mexican-American Foods, NASCO, Fort Atkinson, Wisc.

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Nutritional Analyses of Fast Foods (continued)

	Wt (g)	kcal	PRO (g)	CHO (g)	FAT (g)	Chol (mg)	Vit A (IU)	Vit B_1 (mg)	Vit B_2 (mg)	Nia (mg)	Vit B_6 (mg)	Vit B_{12} (μg)	Vit C (mg)	Vit D (IU)	Ca (mg)	Cu (mg)	Fe (mg)	K (mg)	Mg (mg)	P (mg)	Na (mg)	Zn (mg)	Caffeine (mg)	Saccharin (mg)
BEVERAGES																								
Coffee, 6 oz	180	2	tr	tr	tr	-	0	0	tr	0.5	-	-	0	-	4	-	0.2	65	-	7	2	-	100–150†	0
Tea, 6 oz	180	2	tr	-	tr	-	0	0	0.04	0.1	-	-	1	-	5	-	0.2	-	-	4	-	-	40–100†	0
Orange Juice, 6 oz	183	82	1	20	tr	-	366	0.17	0.02	0.6	-	-	82.4	-	17	-	0.2	340	18	29	2	-	0	0
Chocolate Milk, 8 oz	250	213	9	28	9	-	330	0.08	0.40	0.3	-	-	3.0	-	278	-	0.5	365	-	235	118	-	-	0
Skim Milk, 8 oz	245	88	9	13	tr	-	10	0.09	0.44	0.2	-	-	2.0	-	296	-	0.1	355	-	233	127	-	-	0
Whole Milk, 8 oz	244	159	9	12	9	27	342	0.07	0.41	0.2	-	-	2.4	100	188	-	tr	351	32	227	122	-	-	0
Coca-Cola, 8 oz	246	96	0	24	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	20*	-	30	0
Fanta Ginger Ale, 8 oz	244	84	0	21	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30*	-	0	0
Fanta Grape, 8 oz	247	114	0	29	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21*	-	0	0
Fanta Orange, 8 oz	248	117	0	30	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21*	-	0	0
Fanta Root Beer, 8 oz	246	103	0	27	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	23*	-	0	0
Mr. Pibb, 8 oz	245	93	0	25	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	23*	-	38	0
Mr. Pibb Without Sugar, 8 oz	237	1	0	tr	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	37*	-	38	76
Sprite, 8 oz	245	95	0	24	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	42*	-	0	0
Sprite Without Sugar, 8 oz	237	3	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	42*	-	0	57
Tab, 8 oz	237	tr	0	tr	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30*	-	30	74
Fresca, 8 oz	237	2	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	51*	-	0	80

Sources: Adams CF: *Nutritive Value of American Foods in Common Units*. USDA Agricultural Research Service, Agricultural Handbook No. 456, November 1975.
Coca-Cola Company, Atlanta, Ga, January 1977.
American Hospital Formulary Service. Washington, American Society of Hospital Pharmacists, Section 28:20, March 1978.

* The values for sodium reflect value when bottling water with average sodium content is used, 12 mg/8 oz.

† Caffeine content depends on strength.

From Young, E.A., et al., "Nutritional Analysis of Fast Foods." *Dietetic Currents*, 5 (5) 24-29, September-October, 1978.
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Appendix B

Table 6–12 Food Sources of Iron

Food	Amount	Iron (milligrams)
Beef liver	4 ounces	10.0
Shrimp	3½ ounces	3.1
Hamburger patty	3 ounces	3.0
Most meats	3 ounces	2.0 - 3.0
Prunes, dried	4	2.2
Raisins	1 Tablespoon	0.4
Dates	10	3.0
Dried beans	½ cup	2.5
Spinach, cooked	½ cup	2.0
Iceberg lettuce	3½ ounces	2.0
Most nuts	¼ cup	1.2
Molasses	1 Tablespoon	1.2
Egg	1	1.0
Sweet potato	medium	1.0
Broccoli	2/3 cup	0.8
White potato	medium	0.7
Enriched macaroni products	½ cup	0.7
Enriched white or whole wheat bread	1 slice	0.6
Carrots or string beans	½ cup	0.6
Fresh fruits	½ cup	0.3 - 0.6
Milk	1 cup	0.1

Adapted from Church, C.F. and Church, H.N.: *Food Values of Portions Commonly Used*. 11th ed. Philadelphia, J.B. Lippincott, 1970, and Deutsch, R.M.: *The Family Guide to Better Food and Better Health*. Des Moines, IA, Meredith Corporation, 1971.

Appendix C

A Method for Determining Minimum Wrestling Weight

In the module, it was stated that wrestlers should not reduce their weight below that which represents 7% fat content. The following method can be used to determine this final safe wrestling weight:

1. Determine the athlete's weight in pounds.

2. Using a skinfold caliper, determine the skinfold measurement at the subscapular area. (See Module 2 on appraisal of nutritional status.)

3. Using a skinfold caliper, determine the skinfold measurement at the mid-thigh. This measurement should be taken vertically, halfway between the inguinal ligament and the superior border of the patella.

4. Locate each skinfold measurement on the appropriate scale of the nomogram (Figure 6–1), and ascertain the percentage of body weight which is fat.

5. Substitute the values for body weight and percentage of fat in the following formula, and solve for Y.

$$Y = \frac{\text{Body weight} \times (100 - \text{Percentage Fat})}{100}$$

6. Substitute the calculated value of Y into the following formula, and solve for the "safe wrestling weight."

$$\text{Safe Wrestling Weight} = Y + .07Y$$

For an example of the use of the formulas, consider a 160-pound boy for whom a 20% fat-value is ascertained from the nomogram. Using the formula from Step 5:

$$Y = \frac{160 \text{ pounds} \times (100 - 20)}{100}$$

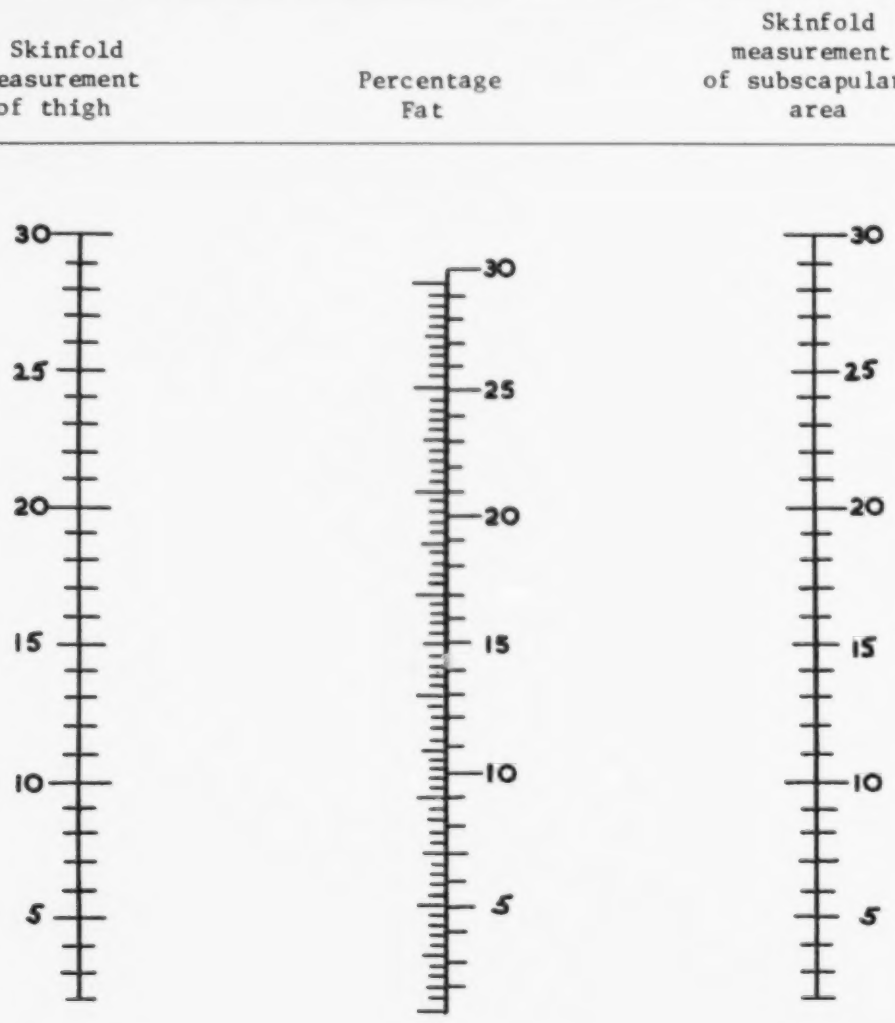
$$Y = 128$$

Using the formula from Step 6:

$$\text{Safe Wrestling Weight} = 128 + .07\,(128)$$
$$\text{Safe Wrestling Weight} = 137 \text{ pounds}$$

The athlete could lose weight safely in the amount of 23 pounds. From other information presented in the module, we know that he could not lose this 23 pounds at a rate faster than 4 pounds per week without a loss of muscle mass.

Figure 6–1 Nomogram for Percentage of Body Fat



Adapted from Sloan, A.W. and deD.Weir, J.B.: "Nomograms for Prediction of Body Density and Total Body Fat from Skinfold Measurements." *Journal of Applied Physiology*, 28(2):221-222, 1970.

Some Abbrevations Used in the Nutrition in Primary Care Series

ATP	adenosine triphosphate
c	cup
cc	cubic centimeter
CNS	central nervous system
FDA	Food and Drug Administration
gm	gram
IBW	ideal body weight
IU	International Units
kcal	kilocalorie
kg	kilogram
lb	pound
lg	large
MCV	mean corpuscular volume
MDR	minimum daily requirement
med	medium
mEq	milliequivalent
mg	milligram
MJ	megajoule
ml	milliliter
oz	ounce
RDA	Recommended Dietary Allowances
RE	retinol equivalents
sl	slice
sm	small
Tbsp	Tablespoon
TPN	total parenteral nutrition
tsp	teaspoon
USDA	United States Department of Agriculture